

Remarks

Upon entry of the foregoing amendment, claims 1-31 and 33-63 are pending in the application, with claims 1, 25, 26, 31, 41, 45, 53, and 56 being the independent claims. Claims 1, 23-25, 31, 35, 37, 39, 45, and 53 have been amended herein, claim 32 has been canceled, and new claim 56-63 have been added. These changes are believed to be fully supported by the specification and are not believed to introduce new matter. Thus, it is respectfully requested that the amendments and additions be entered by the Examiner. Based on the following remarks, Applicant respectfully requests that the Examiner reconsider all outstanding objections and rejections, and that they be withdrawn.

Rejections Under 35 U.S.C. § 112

Claims 23-24 are rejected under 35 U.S.C. § 112, second paragraph. Claims 23 and 24 have been amended to address this rejection, so the Applicant requests that this rejection be removed.

Rejections Under 35 U.S.C. § 102

Claims 1-2, 4, 5, 10-11, 22, 25, 45-47, 53-55 are rejected under 35 U.S.C. 102(a) as being anticipated by U.S. Patent No. 5,930,696 to Tzuang (hereinafter Tzuang). Applicants respectfully traverse this rejection.

Independent claims 1 and 25 recite an *image reject mixer*, and claims 1 and 25 have been amended so that the IF filter *combines I and Q outputs from the image reject mixer*. Independent claims 45 and 53 have been similarly amended.

The Office Action relies on the mixer 11 in FIG. 4B of Tzuang to allegedly teach the image reject mixer recited in claim 1. Upon inspection, mixer 11 is only a double balanced mixer, and there is no indication that the mixer 11 provides image rejection. (See, Col. 7, lines 40-41) Double balanced mixers do not provide image rejection without I and Q quadrature processing. FIG. 9 further illustrates the mixer 11 as a double balanced differential configuration, but there is no indication of image rejection or the I and Q processing that leads to image rejection. (See, Tzuang, FIG. 9) As discussed above, claims 1 and 25 been amended to further define that the IF filter *combines I and Q outputs from the image reject mixer*. The mixer 11 in Tzuang does not produce I and Q outputs, and therefore the filter 13 in Tzuang does not combine I and Q outputs from the mixer 11. Accordingly, Tzuang does not teach or suggest each and every feature of the amended claims 1, 25, 45, and 53 and therefore Tzuang does not anticipate these claims. Accordingly, Applicant requests that the rejection under 35 U.S.C. 102(a) of claim 1, 25, 45, and 53 and their respective dependant claims be removed.

Claims 31-32, 38-40, 53-55 have been rejected under 35 U.S.C. 102(a) as being anticipated by European Patent Application No. 91307764.0 to Loper (hereinafter "Loper"). Applicants respectfully traverse this rejection.

Claim 31 has been amended to include the step of determining an I/Q balance of one or more *individual hardware* components of the tuner, based on the test signal. In Loper, the I/Q channel imbalances are corrected at baseband in the DSP 100 in a cumulative fashion, as opposed to *individual hardware* corrections as recited in claim 31. This is apparent from page 4, lines 15-17 of Loper, which indicates that "[t]he digital signal processing unit 100 automatically adjusts the baseband components from the

channels 30 and 32 during *signal processing* to correct for *hardware-induced errors* based on the operation of the calibration system of the present invention." (See, Loper, page 4, lines 15-17, *emphasis added*) In other words, Loper adjusts the I and Q baseband signals, and does not adjust the parameters of individual hardware components of the tuner in order to improve I/Q imbalance. Accordingly, Loper does not teach each and every feature of claim 31 and therefore does not anticipate claim 31. Therefore, Applicant requests that the rejection of claim 31 be removed and that this claim and its respective dependent claims 33-40 be passed to allowance.

Claim 53 has been amended so that the step of filtering includes *the step of combining I and Q outputs from said I and Q mixing*. As discussed, it is clear from FIG. 2 of Loper that the I and Q channels are not combined until the DSP 100, and are not combined during the basband filtering in the filters 70. (See, Loper, FIG. 2) Accordingly, claim 53 and its respective dependent claims are not anticipated by Loper, and therefore are allowable over the art-of-record.

Rejections Under 35 U.S.C. § 103

Claims 1-12, 23-25, and 45-47 are rejected under 35 U.S.C. 103(a) as being obvious over Loper in view of U.S. Patent No. 4,858,159 to Wheelwright *et al.* Applicant respectfully traverses this rejection.

As discussed above, claims 1, 25, and 45 were amended to include the feature that the IF filter *combines I and Q outputs from the image reject mixer*. Loper does not teach or suggest this feature because the I and Q channels of Loper are not combined until the DSP 100, and not within the low pass filters 70. (See, Loper, FIG. 2)

Wheelwright does not cure this deficiency. Accordingly, Loper in view of Wheelwright does not teach or suggest each and every feature of claims 1, 25, and 45 and therefore does not meet the requirements of *prima facie* obviousness. Accordingly, Applicant requests that the rejection under 35 U.S.C. 103(a) be removed and that these claims be passed to allowance.

Claim 12-13, and 26 was rejected as being obvious over Tzuang in view of Koda *et al.* Applicants respectfully traverse this rejection. Claim 26 recites a tuner, comprising:

a pre-select filter that receives a plurality of channels;
an amplifier that is coupled to said pre-select filter;
an *image reject mixer* that is coupled to said amplifier;
an IF filter coupled to an output of said image reject mixer; and
a test path having a first input coupled to an output of said pre-select filter, and a second input coupled to an output of said amplifier, wherein said test path bypasses said image reject mixer.

As discussed above, Tzuang does not recite an image reject mixer because the mixer 11 is only a double balanced mixer and does provide image rejection.

Furthermore, the Office Action states that "it would have been obvious that the output of each components of the receiver should be measured and tested in order to detect any fault..." and seems to rely on Koda as a example of this. Applicant disagrees.

Claim 26 recites a specific combination of features including a pre-select filter, an amplifier, an image reject mixer, an IF filter, and *a test path having a first input coupled to an output of said pre-select filter, and a second input coupled to an output of said amplifier, wherein said test path bypasses said image reject mixer.* As discussed above, Tzuang does teach or suggest an image reject mixer or the test path as recited in claim 26. Furthermore, as discussed above, the I/Q imbalance correction in Tzuang is performed in a cumulative fashion in the DSP 100 for all of the hardware components in

Tzuang receiver, so there would be no motivation to modify Tzuang to test path to add test and correct individual components, since this would be redundant.

Furthermore, Koda teaches only an electronic switch 30 that bypasses an IF filter 25 when closed. There is no indication that Koda provides an image reject mixer or a test path as recited in claim 26. Accordingly, it would seem to be impermissible hindsight to reject claim 26 when these features are not taught or suggested in the cited references, and there is no motivation to modify either reference to include the recited features of claim 26. Accordingly, Applicant requests that the rejection under 35 U.S.C. 103(a) be removed and that these claims be passed to allowance.

Furthermore, claims 12-13 depend from claim 1 and are allowable over Tzuang for the reasons mentioned above with respect to claim 1. Koda does not cure the defects of Tzuang, nor does the office action alleged this, so claims 12-13 are allowable for being dependent on an allowable base claim, as well as for their own respective features.

Claims 34-37, 41-44, and 48-52 are rejected under 35 U.S.C. 103(a) as being obvious over Loper in view of U.S. Patent No. 5,692,279 to Mang *et al.* Applicants respectfully traverse this rejection. Claims 34-37 depend from claim 31. As discussed above, claim 31 is allowable over Loper for the reasons discussed above. Mang does not cure these defects and therefore claims 34-37 are allowable for the same reasons as claim 31.

Claim 41 recites:

A method of calibrating a tuner for a selected channel, comprising the steps of:

- (1) generating a test signal having a frequency that corresponds to said selected channel;
- (2) injecting said test signal into an input of said tuner;

(3) *determining an I/Q balance of a pre-select filter based on said test signal; and*

(4) *adjusting parameters of said pre-select filter to improve said I/Q balance for said pre-select filter at said selected channel frequency.*

The Office Action seems to rely on Loper to disclose receiver calibration, and relies on Mang to disclose a differential filter. However, as discussed above, the receiver calibration in Loper is done in a cumulative fashion on the baseband signals in the DSP 100, and is not performed by adjusting the individual hardware components of the receiver, such as adjusting the parameters of the pre-select filter as recited in claim 41. Furthermore, the Office Action seems to equate the differential configuration of the filter 86 in Mang with IQ processing. Applicant disagrees with this also. IQ processing necessarily requires a phase shift (e.g. 90 degrees) between channels, which is not necessary for differential processing. Accordingly, based on the above discussion, the recited features in claim 41 are not taught or suggested by the combination of Loper in view of Mang, and therefore the combination of Loper does not meet the requirements for prima facie obviousness. (*See*, MPEP 2143) Therefore, Applicant requests that the rejection under 35 U.S.C. 103(a) be removed and that this claim and its respective dependent claims be passed to allowance.

Claims 48-52 are indicated to be rejected for the same reasons as claims 41-44 above. Claims 48-52 are dependent from amended independent claim 45. Therefore, these claims are allowable for being dependent from an allowable base claim in addition to their own respective features, based on the discussion given above.

Allowed Claims:

Claims 14-21, and 27-30 have been indicated to allowable if re-written in independent form. Claims 14-21 have been written independent form as new claims 56-63, and therefore the Applicant requests that these claims be passed to allowance. Claims 27-30 depend from independent claim 26, which is allowable based on the discussion given herein.

Conclusion

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicants believe that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment and Reply is respectfully requested.

Respectfully submitted,

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